

GREEN BAY BROWN TROUT MANAGEMENT AND FALL TRIBUTARY SURVEYS, 2017

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This report summarizes assessments and management actions for brown trout in Wisconsin water of Green Bay/Lake Michigan completed in 2017. A similar report was completed for 2016 data¹.

Introduction

The Wisconsin Department of Natural Resources (WDNR) has stocked various salmonid species into Green Bay since the 1960's. The initial intent of that stocking effort was to control introduced prey species like alewives and rainbow smelt while providing a quality near shore and offshore fishery for Green Bay anglers. Brown trout provided a consistent early season nearshore and summer trolling fishery, along with other stocked salmonines. Creel survey results indicate that harvest and return rates for Green Bay brown trout were exceptional throughout the late 1980's and 1990's. Since 2000, brown trout fishing has experienced a sharp decline. Stocking numbers for Green Bay have varied somewhat since the 1980's but, in general, remain fairly consistent until 2010 when fingerling stocking was greatly reduced. Between 2011 and 2015, only yearling brown trout were stocked into Green Bay (Figure 1).

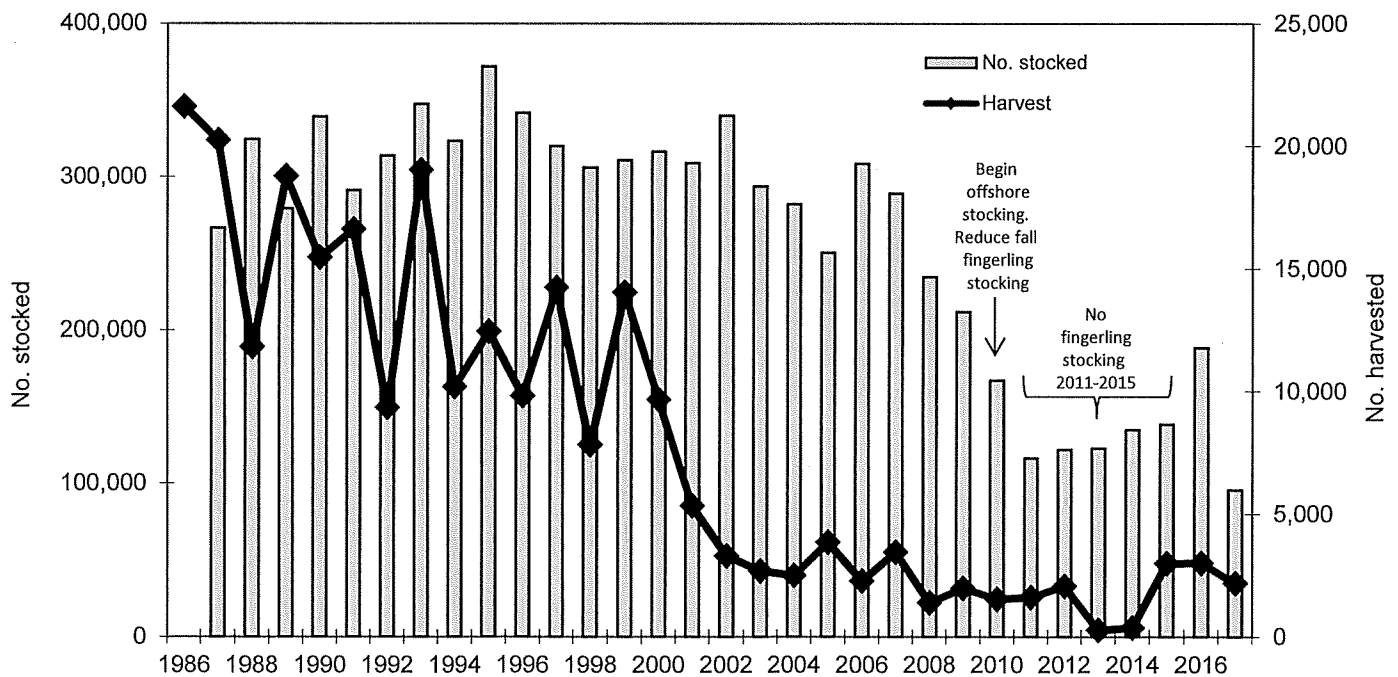


Figure 1. Number of stocked and harvested brown trout in Wisconsin waters of Green Bay by year. Fingerling stocking was reduced in 2010 and eliminated from 2011-2015.

Historically WDNR has stocked several strains and age classes of brown trout into Green Bay and adjacent rivers including: Wild Rose domestic, Wild Rose feral, and St. Croix domestic. To promote an extended trophy fishery, the seeforellen (German) brown trout program was initiated in Green Bay waters in the early 1990's. From 1991 to 2016, Wild Rose domestic and seeforellen strains comprised the majority of brown trout stocking into Wisconsin waters of

¹ Paoli, T. 2017. Green Bay brown trout management and fall tributary surveys. Lake Michigan Management Reports to Great Lakes Fishery Commission. Wisconsin Dept. of Nat. Res., Madison, WI.
<https://dnr.wi.gov/topic/fishing/documents/lakemichigan/GreenBayBrownTrout.pdf>

Lake Michigan although limited numbers of St. Croix brown trout have been stocked as surplus or substituted for Wild Rose domestics throughout the years. A 1996 strain evaluation on Wild Rose domestic, Wild Rose feral, and seeforellen indicated similar rates of returns for age-2 BNT, while seeforellen appeared to live longer and grow faster, thus adding to the trophy element of the fishery².

Background on Seeforellen Strain of Brown Trout

The first seeforellen strain brown trout were stocked in Wisconsin in 1991. WDNR obtained eggs from the State of New York in late 1989-early 1990. The goal was to promote an extended trophy fishery, as seeforellen tend to live a year or two longer and spawn a month or two later in the fall compared to domestic strains of brown trout.

The Menominee River has been surveyed using an electroshocking boat over several weeks each fall since 1992. The purpose of the weekly surveys on the Menominee River was to collect seeforellen brood stock and transport to a hatchery facility for gamete collection (1992-2009). During that time, the Menominee River was one of three brood rivers for seeforellen brown trout. The other brood rivers in Wisconsin were the Kewaunee (Kewaunee Co.) and Root Rivers (Racine Co). From 1992 through 2006, brood fish were transported to Wild Rose Hatchery. Beginning in 2007, brood stock fish have been transported to Besadny Anadromous Fish Facility (BAFF) in Kewaunee. This change was a result of Viral Hemorrhagic Septicemia virus (VHSV) being confirmed in Lake Michigan and Lake Winnebago, followed by concerns with potentially introducing the disease to the Wild Rose Hatchery. Gametes are now collected and fertilized at BAFF and the fertilized eggs are disinfected using iodine, an approved VHSV disinfecting protocol, and transported to the Wild Rose Hatchery.

Several years of low numbers of seeforellen brown trout captured in the Menominee River prompted the WDNR to discontinue utilizing the Menominee River as a brood river beginning in 2010 and to move that quota of seeforellen to the Stone Quarry adjacent to the Sturgeon Bay shipping canal in Door County. Other recent changes to the brown trout stocking practices in Green Bay include offshore stocking using various methods including the USFWS M/V Spencer Baird and WDNR pontoon net pen in 2010 and 2011. Beginning in 2012, the WDNR *RV Coregonus* has been used to stock Green Bay brown trout offshore. The offshore stocking strategy was initiated because of low harvest returns on brown trout and concerns with post-stocking survival in the Green Bay tributaries which have significant walleye runs in April. Those walleye spawning runs often coincide with the timing of stocking brown trout. To gauge the relative success of the offshore stocking, the portion of brown trout still stocked nearshore were marked using an adipose and one other unique fin clip each year. These clipped fish were stocked at the Stone Quarry/Sturgeon Bay canal through the ice in early February from 2010 to 2015. Due to low returns of those clipped fish in creel surveys, that quota was moved back to the Menominee River for 2016. As a result, 28,884 seeforellen with an adipose + right pectoral clip were stocked into the Menominee River through the ice in February 2016.

Until 2016, approximately 320,000 seeforellen were stocked in Wisconsin waters of Lake Michigan. Roughly 30,000 seeforellen yearlings were stocked annually into each brood river (Kewaunee, Root Rivers) and each year class of fish had a unique clip (adipose + one other clip). The adipose clip is to designate that a fish is a seeforellen and allows us to pass on that genetic line. The other fin clip allows us to tell the age of the fish since that clip changes annually. Several years of declining seeforellen returns in the Kewaunee River beginning around 2009 prompted the WDNR to add the Sheboygan River as a third brood river beginning in 2015 and therefore receive clipped seeforellen for recapture in subsequent years.

In attempt to increase returns of seeforellen in the Kewaunee River, an alternative stocking method was pursued in 2015. A total of 2,208 seeforellen were given a unique clip (adipose + dorsal + left pectoral) and stocked in three net pens (one 24' x 6' x 4' pen and two 8' x 4' x 4' pens) on April 13, 2015. After being held and fed within the pens for 15 days, fish were released. For the release, brown trout from the two smaller pens were carefully dumped into the larger pen (at the dock) and the larger pen was slowly towed downstream about one mile at dusk to release the fish just outside the harbor in Lake Michigan. An additional 33,238 seeforellen stocked into the Kewaunee River in 2015 were

² Belonger, B. 1996. Brown trout strain evaluation. Pages 55-56 in Lake Michigan Management Reports to Great Lakes Fishery Commission, Wisconsin Dept. of Nat. Res., Madison, WI.

given an adipose + left pectoral clip. Due to fish health issues with net penned Kewaunee River Chinook salmon in 2015, a net pen was not used for brown trout in 2016. A net pen was not used in 2017 for brown trout on the Kewaunee River due to overlap in timing with net penned Chinook salmon in that river.

Prior to 2016, approximately 60,000 seeforellen were hand clipped at Wild Rose Hatchery each winter. Six people could collectively clip 2000-3000 fish per hour. Due to staff time required, only a portion of the seeforellen quotas for Lake Michigan were clipped. In July 2016 and 2017, staff from U.S. Fish and Wildlife Service Green Bay Fishery Resources office (USFWS-GBFRO) utilized their autotrailer to adipose clip all seeforellen at Wild Rose Hatchery that were later stocked into Lake Michigan as yearlings in 2017 and 2018. 2017 was the second year that brown trout were clipped using the trailer and that effort took 45.4 machine hours, averaging 8,100 fish/hour (J. Webster, USFWS pers. comm.). Marking all seeforellen with the autotrailer saves considerable staff time and will allow WDNR to evaluate returns of seeforellen by being able to distinguish Wisconsin stocked seeforellen from other strains of brown trout stocked by nearby states or wild brown trout captured in creel surveys and tributary surveys. Also, having all seeforellen with an adipose clip will allow greater flexibility to collect brood stock from other rivers if needed, rather than relying only on the Root, Sheboygan, and Kewaunee Rivers as sources of known (marked) seeforellen.

Recent Stocking Decisions

Return to creel of brown trout in Green Bay has fallen from an average of 4% prior to 2000 to 1% or less from 2001 to 2014. In 2017, return to creel of stocked brown trout was 1.8%. That estimate only considers Wisconsin stocked yearlings at Age-2. That age class was chosen because the majority of harvested fish are in the low 20-inch range and likely Age-2. A comprehensive review of brown trout data and related fisheries information was completed in 2009³. In 2010, we adopted a strategy to stock a portion of the brown trout offshore to avoid nearshore predators and to discontinue stocking fall fingerlings into Green Bay. That strategy adjusted stocking in Green Bay with the following management objective:

Two indices measured by creel surveys for Green Bay waters (% return and total harvest of brown trout) will trend towards the targets within five years of implementation of the plan. Results should indicate consistent returns from stocking levels. Fishing pressure will be considered in the analyses to determine if changes in harvest or return rate are associated with changes in effort. Lastly, catch per unit effort of fall electrofishing surveys in the lower Menominee River will continue to serve as a fishery-independent index of brown trout abundance in Green Bay.

The 2010 target indices are:

- a) Total harvest greater than or equal to 4% of number stocked BNT. This return rate is comparable to return rates for Green Bay prior to 2000; OR*
- b) Total harvest of 5,000 or more fish based on 126,000 yearlings stocked annually into Green Bay, AND*
- c) Brown trout harvest rate less than or equal to 23 hours per fish based on targeted total salmonid fishing effort.*

In October 2016, the WDNR decided to reduce brown trout stocking in Wisconsin waters of Lake Michigan in response to a declining forage base, poor returns, and high cost of production. For 2017, brown trout stocking was reduced from approximately 693,000 to 356,000 for Wisconsin waters of Lake Michigan. As a result, the Wild Rose strain of brown trout was discontinued and the Thunder River Hatchery in Crivitz, WI was decommissioned. WDNR decided to stock only seeforellen brown trout beginning in 2017 and moving forward. Wild Rose strain brown trout being raised at Thunder River and Brule Hatcheries were stocked in 2016 as fall fingerlings instead of as yearlings in 2017. As a result, Green Bay received a one-time surplus of fall fingerling brown trout in 2016 (Figure 1).

In response to the brown trout stocking reduction, the WDNR evaluated the stocking locations and numbers of seeforellen brown trout in Lake Michigan. The evaluation involved consultation with the Lake Michigan Fisheries Forum

³ Brown trout issue brief. December 2009. Internal WDNR memo from Lake Michigan Fisheries Team to Fisheries Management Board.

and the general public. Meetings were held in December 2016 and January 2017 to discuss stocking strategies and distribution for the remaining (seeforellen) brown trout. A stocking allocation strategy was developed that evenly distributes 75% of the quota across each county. Next, the strategy incorporates species specific harvest rates and directed effort for brown trout to allocate the remaining 25% of brown trout based on those parameters. Green Bay's portion of brown trout was reduced from 126,000 to 95,557. The 2017 quota included 75,557 yearlings and 20,000 fall fingerlings. Because fewer yearling brown trout were stocked in Green Bay in 2017, all yearlings were planned to be stocked offshore with the RV Coregonus and none stocked through the ice directly into rivers. However, a load of 9,285 yearlings were stocked into Little River in April instead of offshore due to high winds on the Bay (Table 1).

The 2010 management objective initially called for five years of offshore stocking. Full implementation did not begin until 2012, with the use of the newly acquired *RV Coregonus* and more consistent methods of offshore stocking compared to 2010 and 2011. WDNR plans to continue offshore stocking the yearling quota of brown trout into Green Bay at least through 2018. The fall fingerling quotas will be stocked directly into tributaries. An updated 2018 target index for total harvest is 3000 or more fish harvested based on 75,557 yearlings stocked (beginning in 2017), compared to 5000 or more fish harvested based on 126,000 yearlings stocked (2016 and earlier).

Table 1. WDNR brown trout stocking information for Green Bay in 2017.

<i>Date</i>	<i>Location</i>	<i>Strain/Size</i>	<i>Number</i>	<i>Clip</i>	<i># fish per lb.</i>	<i>Rearing Facility</i>	<i>Vessel Used</i>
17-Apr-2017	Offshore Grid 804	Seeforellen yearling	38,120	AD	7.8	Wild Rose SFH	RV Coregonus
19-Apr-2017	Offshore Grid 703	Seeforellen yearling	27,575	AD	7.8	Wild Rose SFH	RV Coregonus
20-Apr-2017	Little River at Krause Road	Seeforellen yearling	9,285	AD	7.5	Wild Rose SFH	--
29-Sept-2017	Little River at mouth	Seeforellen fingerling	10,350	AD	28.0	Wild Rose SFH	--
29-Sept-2017	Peshtigo River at city garage	Seeforellen fingerling	10,350	AD	28.0	Wild Rose SFH	--
		Total yearlings	74,980				
		Total fingerlings	20,700				

Creel Results and Discussion

The harvest estimate for open water Green Bay brown trout in 2017 was 2081 fish, down from the 2016 estimate of 3011 brown trout (Figure 1). Annual harvest remained below the target of 5000 fish but is still improved from 2008 through 2014. Harvest rates also declined in 2017 (29 hours/fish), compared to 11 hours/fish in 2016 (Figure 2). Since offshore stocking using the *RV Coregonus* began in 2010, harvest rate has generally improved compared to the previous 8 years. Two exceptions are 2013 and 2014, which were late ice-out springs which prevented early season nearshore trolling for brown trout.

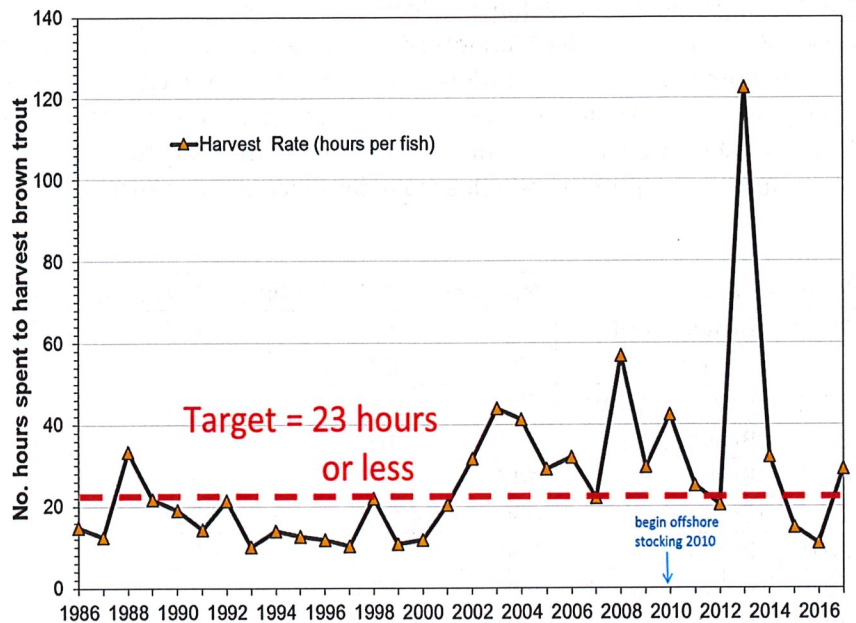


Figure 2. Harvest rate (hours per fish) for Green Bay brown trout, based on total salmonid fishing effort (angler hours) for Green Bay.

Brown Trout Derby

The Marinette-Menominee Great Lakes Sportfishing Club has sponsored a summer Brown Trout Derby since 1981. Data sets from this derby indicate that upwards of one thousand brown trout were typically harvested during the two-day event. However, from 2001 to present, the number of brown trout registered in the derby is much lower than in the 1980's and 1990's. While weather and participation can play a significant role in the two-day catches, the long-term trends in catches are reflective of annual harvest trends. In 2017, the number of brown trout registered was 125 fish (Table 2).

	BROWN TROUT		CHINOOK		RAINBOW TROUT		WALLEYE	
	#	Avg lb.	#	Avg lb.	#	Avg lb.	#	Avg lb.
2005	237	4.7	1694	5.8	32	5.7	29	5.2
2006	28	5.4	693	10	10	4.1	44	2.3
2007	143	5.9	969	8.5	54	6	22	2.9
2008	102	8.4	730	8.4	47	5.6	30	3.1
2009	26	7.8	444	8.7	18	6.5	21	3.1
2010	89	8	818	9.6	39	4.9	55	3.8
2011	13	8.5	87	9.6	10	5.5	231	2.8
2012*	211	6.89	344	10.36	165	4.53	23	3.84
2013*	16	7.90	60	9.82	7	8.96	13	4.50
2014*	70	7.4	97	11.3	13	7	14	4.5
2015*	189	7.0	205	11.0	57	5.5	18	5.8
2016*	41	7.0	219	8.9	64	6.5	16	6.4
2017*	125	9.1	41	10.9	19	7.1	22	4.1

*Participants allowed to register only one fish per species per day beginning in 2012. Past rules allowed for all legal fish to be registered.

Table 2. Number and mean weights of fish harvested during the two-day Brown Trout Derby.

Floy-tagging Studies and Voluntary Fishing Logbooks

Since 2009, WDNR and the Marinette-Menominee Great Lakes Sportfishing Club have cooperatively floy-tagged yearling trout that are stocked into the Menominee Marina for the club-sponsored annual Kid's Fishing Day. The goal of this tagging project is to gain information on harvest return and movement of fish. Excluding the fish that were harvested for the Kid's Fishing Day, the percent return from brown trout stocked has varied from zero to 5.9% (Table 3). These returns also include fish captured and released in fall electrofishing surveys or in the fish lift on the lower Menominee River.

Year	Species	Number	Avg. size (in.)	% return
2009	Brown trout	392	11.1	4.7
2010	Brown trout	772	8.6	0
2011	Rainbow trout	415	10.0	1.9
2012	Brown trout	1118	10.1	2.2
2013	Brown trout	947	10.6	2.7
2014	Brown trout	850	9.9	5.9
2015	Brown trout	864	10.4	5.7
2016	Rainbow trout	890	12.2	1.5
2017	Rainbow trout	933	10.4	0.7

Table 3. Percent return (as of March 2018) of floy-tagged trout stocked by the Marinette-Menominee Great Lakes Sportfishing Club.

WDNR distributes voluntary fishing logbooks to anglers who frequently target brown trout on Green Bay. The number of brown trout caught by participating anglers was substantially higher in 2012, 2015, 2016 and 2017 than in other years (Table 4). These four years of good brown trout fishing were also reflected in the overall Green Bay creel estimates (Figure 1).

Table 4. Information from voluntary fishing logbooks, 2010-2017.

	2010	2011	2012	2013	2014	2015	2016	2017
# logbooks turned in	12	5	17	8	6	13	12	10
# brown trout caught	32	48	412	18	35	516	268	215
Average of Catch per Effort (hours per fish)	6.7	4.1	4.5	4.5	7.0	4.1	4.2	3.3
Average of length (in.)	24.4	21.7	22.1	19.8	20.6	21.6	21.4	22.4

Menominee River Summary

Although the Menominee River is not currently a brood stock river for seeforellen, that river is surveyed regularly to collect information on fall runs of fish due to local angling interest in salmonids and to serve as a fishery-independent index of brown trout abundance. Between 2010 and 2015, WDNR stocked brown trout offshore and not directly into the Menominee River. In 2016, 28,884 uniquely clipped (adipose + right pectoral) yearling seeforellen brown trout, along with 30,708 unclipped Wild Rose domestic strain fingerlings were stocked into the Menominee River.

Electrofishing surveys targeting trout and salmon on the lower Menominee River were completed weekly beginning on October 11 and ending on November 16, 2017. The effort occurs over a ½ mile section of the river from the Stephenson Island boat landing to the Menominee dam. Fifty-one brown trout were captured (27 males; 24 females) (Table 5), with a mean length of 26.4 inches. One brown trout had a floy tag and was stocked by the M&M Great Lakes Sportfishing Club in the Menominee Marina in 2014. Seven brown trout had an adipose + right pectoral clip. There was no significant difference ($z = 0.3$, $p = 0.739$) in the proportion of river-stocked (clipped) fish to offshore stocked (unclipped) in the same size range (20-26 inches).

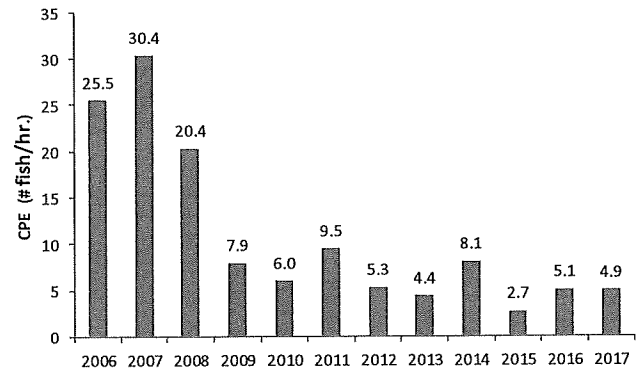


Figure 3. CPE (# fish/hour) of brown trout captured during fall electrofishing surveys on the lower Menominee River, 2006-2017.

The combined CPE for brown trout was 4.9 fish/hour, down from 5.1 fish/hour in 2016 (Figure 3). Forty-eight rainbow trout were captured in 2017, up from 29 in 2016. Only three pink salmon were captured in 2017 (Table 5), but sampling efforts did not begin until mid-October and after the peak of the pink salmon run. Chinook salmon with an adipose fin clip were collected and heads were sent to USFWS-GBFRO for coded wire tag analysis (Table 8). Chinook heads that were collected by Michigan DNR in the Menominee dam fish lift are also listed in Table 8. Forty-eight percent of tagged Chinook salmon that were recovered in October were stocked into tributaries of the west shore of Green Bay.

During the fall sampling period, water levels in the lower Menominee River were high due to above normal Lake Michigan water levels. In addition, discharge from the river was above average (Table 5). High flows at 6310 cubic feet per second may have contributed to good catches of trout on October 31. In summary, the number of brown trout decreased and rainbow trout increased in the fall electrofishing surveys compared to 2016 (Table 7).

Table 5. Number of adult fish captured by species and date on the lower Menominee River.

Date	Water Temp	Flow (cfs)	Brown Trout	Rainbow Trout	Chinook Salmon	Pink Salmon
11-Oct-2017	56	5550	6	1	2	1
18-Oct-2017	54	4050	3	3	0	1
25-Oct-2017	48	3750	13	9	1	0
31-Oct-2017	44	6310	19	16	2	1
6-Nov-2017	40	6070	6	7	0	0
14-Nov-2017	34	4000	2	9	0	0
16-Nov-2017	35	4630	2	3	0	0
TOTAL			51	48	5	3

Peshtigo River Summary

Prior to 2015, the Peshtigo River was surveyed only periodically in the fall for salmonids. Beginning in 2015, the Peshtigo River has been surveyed on a similar schedule (weekly) as the Menominee River. Electrofishing surveys targeting trout and salmon were completed on the lower Peshtigo River from the city garage landing/RR bridge upstream to the riffle that is approximately ¼ mile upstream from the boat landing. On some days, the boat could maneuver above the riffle to cover the additional stretch from the riffle upstream approximately 500 feet to the next shallow area. Surveys were completed weekly from October 4 through October 25, and on November 21, 2017. Seven brown trout were captured with a mean length of 24.4 inches. Eight pink salmon were captured (5 males; 3 females). Ten Chinook salmon were captured (Table 6), including eight with adipose clips that were kept for coded-wire tag extraction. Heads were sent to USFWS-GBFRO for analysis (Table 8).

Table 6. Number of fish captured by species and date on the lower Peshtigo River.

Date	Water Temp	Flow (cfs)	Brown Trout	Rainbow Trout	Chinook Salmon	Pink Salmon
4-Oct-2017	63	665	0	0	1	5
11-Oct-2017	56	1320	2	0	0	3
18-Oct-2017	54	1310	2	0	5	0
25-Oct-2017	49	938	1	0	4	0
21-Nov-2017	34	1100	2	0	0	0
TOTAL			7	0	10	8

Table 7. Number of fish by species caught in 2015-2017 in the Menominee and Peshtigo River fall electrofishing surveys.

	Menominee River			Peshtigo River		
	2015	2016	2017	2015	2016	2017
Brown trout	31	76	51	4	9	7
Rainbow trout	9	29	48	2	0	0
Chinook salmon	8	3	5	7	9	10
Pink salmon	0	63	3	28	23	8

Table 8. Stocking information from adipose-clipped Chinook salmon collected in Fall 2017. Data courtesy of USFWS-GBFRO mass marking program.

Capture Location	Capture Date	Length (inch)	Weight (lbs.)	Sex	CWT #	Year Stocked	Agency	Lake	Stocking Location
MR lift	10/16/2017	32.5	20.5	U	640654	2014	WDNR	Michigan	Gills Rock
MR lift	10/19/2017	35.5	14.5	M	640777	2015	MDNR	Michigan	Manistique R, Little Bay de Noc
MR lift	10/16/2017	34.1	14	M	640664	2014	WDNR	Michigan	McKinley Marina net pen, Port Washington
MR lift	10/12/2017	38	15	M	640772	2015	WDNR	Michigan	Menominee R, MR net pen, Little R, Oconto R
MR lift	10/16/2017	36	16	M	640772	2015	WDNR	Michigan	Menominee R, MR net pen, Little R, Oconto R
MR lift	10/17/2017	34	14	M	640772	2015	WDNR	Michigan	Menominee R, MR net pen, Little R, Oconto R
MR lift	10/23/2017	36.2	17	M	640772	2015	WDNR	Michigan	Menominee R, MR net pen, Little R, Oconto R
MR lift	10/23/2017	34.4	13	M	640893	2016	WDNR	Michigan	Root River
Men R survey	10/31/2017	23.9	4.5	M	640654	2014	WDNR	Michigan	Gills Rock
Men R survey	10/31/2017	34.5	14.8	F	640654	2014	WDNR	Michigan	Gills Rock
Men R survey	10/9/2017	36.3	13.8	F	640770	2015	WDNR	Michigan	Gills Rock
Men R survey	10/9/2017	32	13.3	M	640772	2015	WDNR	Michigan	Menominee R, MR net pen, Little R, Oconto R
Men R survey	10/9/2017	33.3	15.7	M	640772	2015	WDNR	Michigan	Menominee R, MR net pen, Little R, Oconto R
Men R survey	10/11/2017	35.8	17.7	F	640772	2015	WDNR	Michigan	Menominee R, MR net pen, Little R, Oconto R
Men R survey	10/11/2017	34.1	16	F	640772	2015	WDNR	Michigan	Menominee R, MR net pen, Little R, Oconto R
Men R survey	10/9/2017	37.2	18.5	M	640898	2016	WDNR	Michigan	Menominee R, MR net pen, Little R, Oconto R
Men R survey	10/25/2017	25.6	6.9	M	640899	2016	WDNR	Michigan	Strawberry Creek
Peshtigo R	10/25/2017	25.1	2.8	M	640654	2014	WDNR	Michigan	Gills Rock
Peshtigo R	10/18/2017	37.5	17.5	F	640770	2015	WDNR	Michigan	Gills Rock
Peshtigo R	10/18/2017	34.4	13.3	M	640772	2015	WDNR	Michigan	Menominee R, MR net pen, Little R, Oconto R
Peshtigo R	10/25/2017	33.3	13	M	640772	2015	WDNR	Michigan	Menominee R, MR net pen, Little R, Oconto R
Peshtigo R	10/25/2017	32.9	10.6	M	640660	2014	MDNR	Huron	Swan River
Peshtigo R	10/25/2017	33	10.2	F	640887	2016	MDNR	Huron	Swan River
Peshtigo R	10/18/2017	19.7	2.8	M					tag damaged & not readable
Peshtigo R	10/18/2017	25.7	7.3	M					tag lost at extraction

Men R survey = Menominee River electrofishing survey; MR lift = Menominee River fish lift at dam; Peshtigo R = Peshtigo River electrofishing survey

Seeforellen Gamete Collection Summary

Beginning in late October or November, WDNR crews use electroshocking boats on the Kewaunee, Sheboygan, and Root Rivers to collect seeforellen adults that are identified by a unique fin clip. Adult seeforellen are transferred to Besadny Anadromous Fish Facility where they are held in ponds. Once a week from mid-November to mid-December, propagation staff collect eggs and milt from ripe adults. Fertilized, disinfected eggs are transferred to the Wild Rose Hatchery. Fish that are not yet ready to spawn are returned to the ponds to be spawned at a later date until the goal of 1 million eggs is collected to fill Wisconsin's Lake Michigan and Lake Superior seeforellen quotas.

In 2017, WDNR sampled the Kewaunee River using one boat on 3 days between November 7 and November 29. Seeforellen catches increased considerably in the Kewaunee River compared to recent years. In 2017, a total of 147 Kewaunee River fish were sampled, up from 47 in 2016 and 23 in 2015. The Root River was also sampled 5 days between October 31 and 15, 2017 using one electrofishing boat each day. Fish were given a top caudal clip prior to being transported to BAFF to distinguish each fish as a Root River fish for data analysis purposes. WDNR also sampled the Sheboygan River on November 9 using two electrofishing boats, and on November 15 using one boat. Fish were given a bottom caudal clip prior to being transported to BAFF to distinguish each fish as a Sheboygan River fish for data analysis purposes. Total effort for all three rivers was 11 electrofishing boat-days.

In 2017, seeforellen gametes were collected at BAFF during four spawning events: November 15, 21, 28, and December 5. Fertilized, disinfected eggs were transported to Wild Rose Hatchery on each spawning date (Table 9). Thirty fish (15 males; 15 females) were evaluated for fish health on November 28. Fish samples tested positive for Furunculosis, a bacterial disease that is rather widespread (pers. comm. Danielle Godard). Virology tests were negative. Fish that were not sacrificed for disease testing were transported via stocking truck below the weir and released in the Kewaunee River either the day of gamete collection or on the last day if still green/hard.

A skewed sex ratio of approximately 1 male for every 2 females in both the Root and Kewaunee Rivers was noted beginning in 2008, when routine data collection on those two rivers began. This trend continued through 2015. Beginning in 2016 and continuing in 2017, the sex ratio for the Kewaunee River was closer to 1:1. Beginning in 2017, the Root River sex ratio was also closer to 1:1. However, in the Sheboygan River, the sex ratio in 2017 was 1 male for nearly every 3 females but sample sizes are low. In contrast, the Menominee River brown trout sex ratios continue to be close to 1:1 males to females, but that figure includes all strains.

There was no significant difference in the weight of Age-2 females collected from the Root River ($M=6.59$ lb, $SD=1.37$) and the Kewaunee River ($M=6.85$ lb, $SD=1.02$); $t(151) = 1.98$, $p = 0.24$. Due to low sample sizes, Sheboygan River fish were not included in this analysis.

Out of the 11 age-3 fish from the Kewaunee River (ALP clip) in 2017, two fish had an ALP+dorsal clip, indicating they were from the 2015 net pen stocking event in the Kewaunee River. In 2016, two out of 27 were net pen fish. Of the clipped seeforellen stocked in the Kewaunee in 2015, 6.6% were net penned fish. Using a 2-sample z-test, there was no significant difference in the contribution of net pen versus non-net pen fish in 2016 ($z = 0.20$, $p = 0.867$), or in 2017 ($z = 1.5$, $p = 0.121$).

There has been concern in recent years of fewer older fish contributing to the genetic lineage which could have impacts on the trophy potential of the seeforellen strain. In 2011, 23% of fish processed were age 4 and older. That percentage declined to 13% in 2012, 10% in 2013, and 5% in 2014. The proportion of age 4 and older fish increased to 11% in 2015, but dropped to only 5% in 2016 and 2017 (Figure 4).

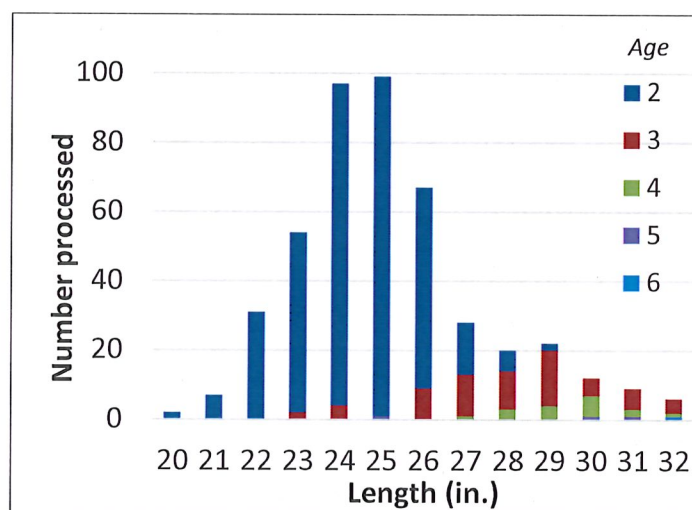


Figure 4. Length frequency by age of seeforellen processed at BAFF in 2017. Kewaunee, Root, and Sheboygan Rivers combined.

Table 9. Number of seeforellen brown trout processed for biological data at BAFF by river source and sex in 2017. Each day includes all fish not sent back to the ponds for later spawning. Gametes were not collected on every fish as some fish were spent or hard (last day). Mortalities removed from the pond are not included in this table.

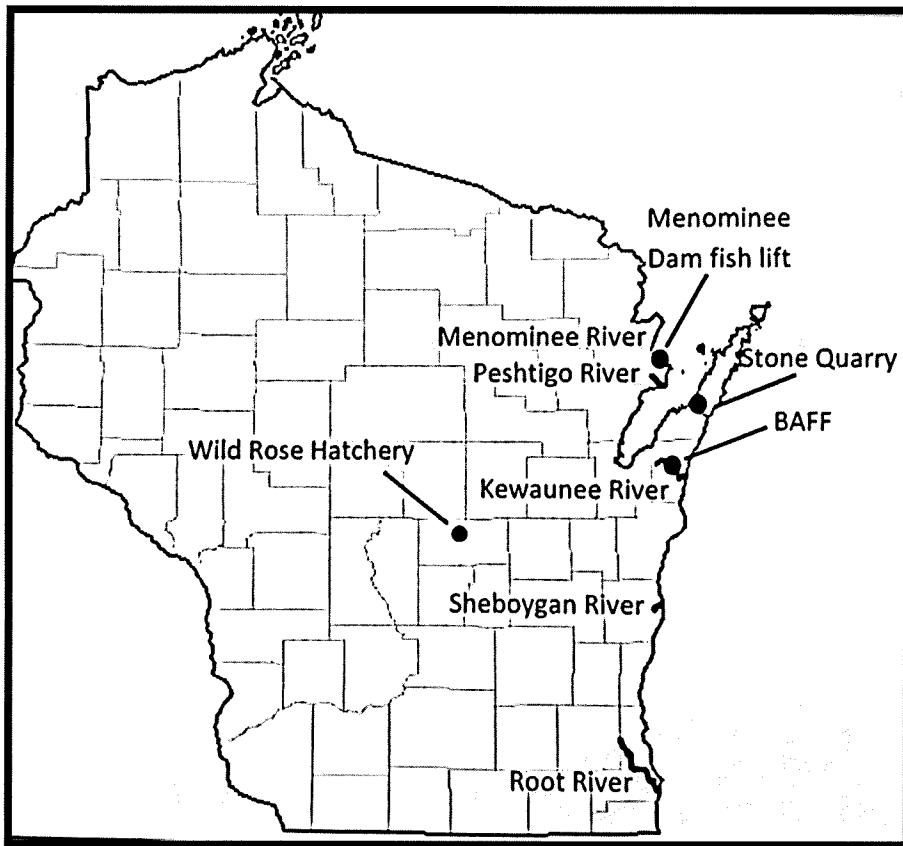
Date	Root River		Kewaunee River		Sheboygan River		Eggs collected
	Males	Females	Males	Females	Males	Females	
15-Nov-2017	25	29	13	4	0	0	188,460
21-Nov-2017	32	28	11	9	1	6	255,016
28-Nov-2017	37	60	18	12	2	6	533,544
5-Dec-2017	33	41	45	35	4	7	305,352
TOTAL	127	158	87	60	7	19	1,282,372

Summary

Beginning in 2017, all yearling brown trout that Wisconsin stocks into Lake Michigan receive an adipose fin clip through the efforts of the USFWS-GBFRO mass marking trailer. This will allow WDNR to further evaluate relative contributions of Wisconsin brown trout compared to unclipped brown trout stocked by Michigan DNR in northern Green Bay. We will utilize creel surveys, fall electroshocking surveys, fish registered at the Brown Trout Derby, and voluntary fishery logbooks to continue to evaluate the status of Green Bay brown trout. Seeforellen brood stock will continue to be collected in the Root, Sheboygan, and Kewaunee Rivers but greater flexibility on collecting brood stock from other rivers will be possible now that all seeforellen will be uniquely clipped. Fall assessments will also be conducted in the Menominee and Peshtigo rivers. WDNR plans to continue offshore stocking the yearling brown trout into Green Bay at least through 2018. Since offshore stocking using the *RV Coregonus* began in 2010, harvest rate has generally improved compared to the previous 8 years. Two exceptions are 2013 and 2014, which were late ice-out springs which prevented early season nearshore trolling for brown trout. The target indices will continue to be evaluated and any major changes to management actions will be discussed with stakeholders.

Acknowledgements

WDNR fisheries staff from Peshtigo, Green Bay, and Sturgeon Bay offices participated in the Menominee and Peshtigo River surveys targeting trout and salmon. Michigan DNR Staff from the Northern Lake Michigan Management Unit collected Chinook from the Menominee dam fish lift. WDNR Fisheries staff from Green Bay and Besadny Anadromous Fish Facility collected brood fish on the Kewaunee River. WDNR Fisheries staff from Milwaukee and Eagle collected and transported brood fish from the Root River. WDNR Fisheries staff from Asylum Bay and Eagle collected and transported brood fish from the Sheboygan River. WDNR Staff from Wild Rose Hatchery and Besadny Anadromous Fish Facility were involved in various aspects of seeforellen gamete collection and rearing the fish. WDNR Fish Health staff from Madison collected samples at BAFF. Peshtigo staff collecting biological data at BAFF. Data for trout and salmon for all surveys was entered into the WDNR Lake Michigan Fish Tracking Database by Peshtigo fisheries staff. U.S. Fish and Wildlife Service Green Bay Fishery Resources office (Jim Webster) utilized their autotrailer to adipose clip all seeforellen at Wild Rose Hatchery, which allowed for all seeforellen brown trout to be clipped while saving countless hours that DNR staff previously spent hand clipping only a fraction of the fish.



Map of locations referenced in report.